

REMARKS

Status of Claims:

Claims 5 and 16 remain cancelled. Thus, claims 1-4, 6-15, and 17-27 are present for examination.

Allowable Subject Matter:

Applicant expresses appreciation to the Examiner for the indication that claims 20 and 21 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Objection:

Claim 22 is objected to because of the following informality: change “the operation” in line 5 to --an--.

Claim 22 has been amended in accordance with the Examiner’s suggestion.

Claim Rejection under 35 U.S.C. 112:

Claims 1-4, 6-10, and 25-27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claims 1-4, 6-10, and 25-27, as amended, the rejection is respectfully traversed.

Independent claim 1, as amended, recites a receiving terminal for a CDMA system, comprising:

“a finger circuit having a plurality of finger circuit elements, each of said plurality of finger circuit elements for making a correlation between a received signal from a radio circuit connected to an antenna and a known signal and for outputting a correlated received signal as a result of the correlation; and

a rake circuit for combining the correlated received signals output from the plurality of finger circuit elements;

wherein the rake circuit includes a level judgment circuit for executing electric field level judgment based on the correlated received signals output from the plurality of finger circuit elements and a predetermined threshold level; and

wherein an operation of at least one finger circuit element can be suspended for a fixed, predetermined time period according to the result of the electric field level judgment.” (Emphasis Added)

Claim 1 has been amended to make it clear that each of the plurality of finger circuit elements is for outputting a correlated received signal as a result of a correlation, that the rake circuit is for combining the correlated received signals output from the plurality of finger circuit elements, and that the level judgment circuit is for executing electric field level judgment based on the correlated received signals output from the plurality of finger circuit elements and a predetermined threshold level. Therefore, there is no longer any contradiction between the limitations in claim 1, and it is clear that a signal output from a finger circuit element is a correlated received signal.

Therefore, independent claim 1, as amended, is believed to be in compliance with the requirements of 35 U.S.C. 112, second paragraph. Dependent claims 2-4, 6-10, and 25-27 depend from independent claim 1 and are believed to be in compliance with the requirements of 35 U.S.C. 112, second paragraph, for at least the same reasons indicated above with respect to claim 1.

Claim Rejections under 35 U.S.C. 102 and 103:

Claims 1, 8, 12, and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by Sudo et al. (U.S. Patent Number 6,625,202) (hereinafter Sudo ‘202).

Claims 1-4, 8, 11-15, 19, and 22-24 are rejected under 35 U.S.C. 102(e) as being anticipated by Sudo et al. (U.S. Patent Number 6,363,101) (hereinafter Sudo ‘101).

Claims 6, 7, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo et al. in view of Ishikura (U.S. Patent Number 5,239,684).

With respect to claims 1-4, 6-8, 11-15, 17-19, and 22-24, as amended, the rejections are respectfully traversed.

Independent claim 1, as amended, recites a receiving terminal for a CDMA system, comprising:

“a finger circuit having a plurality of finger circuit elements, each of said plurality of finger circuit elements for making a correlation between a received signal from a radio circuit connected to an antenna and a known signal and for outputting a correlated received signal as a result of the correlation; and

a rake circuit for combining the correlated received signals output from the plurality of finger circuit elements;

wherein the rake circuit includes a level judgment circuit for executing electric field level judgment based on the correlated received signals output from the plurality of finger circuit elements and a predetermined threshold level; and

wherein an operation of at least one finger circuit element can be suspended for a fixed, predetermined time period according to the result of the electric field level judgment.” (Emphasis Added)

A receiving terminal for a CDMA system including the above-quoted features has the advantage that an operation of at least one finger circuit element can be suspended for a fixed, predetermined time period according to the result of an electric field level judgment, where the at least one finger circuit element is for making a correlation between a received signal and a known signal and for outputting a correlated received signal as a result of the correlation. By suspending the operation of the at least one finger circuit element, power consumption of the receiving terminal can be reduced as compared with prior art receiving terminals. (Substitute Specification; page 1, lines 29-30; page 4, lines 18-23; page 8, lines 28-31).

Neither Sudo ‘202 nor Sudo ‘101 disclose or suggest a receiving terminal for a CDMA system including the above-quoted features. The Examiner stated, with respect to claim 1 as previously presented, that “the finger circuit makes a correlation between a received signal and a known signal instead of a finger circuit element”. As a result, with

respect to the low noise amplifier (LNA) 8 of the device of Sudo '202, the Examiner stated that, "the Examiner considers 'LNA 8' to be 'a finger circuit element' within the broad meaning of the term."

Claim 1 has now been amended to make it clear that each of the plurality of finger circuit elements is for making a correlation between a received signal and a known signal and for outputting a correlated received signal as a result of the correlation. Therefore, the LNA 8 of the device of Sudo '202 cannot be considered a finger circuit element in accordance with the limitations of claim 1, as amended.

In Sudo '202, a received signal S1 from a receiving antenna 1 is passed through a dielectric filter 3, an amplifier (LNA) 4, and a SAW filter 5. (Sudo '202; FIG. 4). In addition, a received signal S2 from a receiving antenna 6 is passed through a dielectric filter 7, the amplifier (LNA) 8, and a SAW filter 9. (Sudo '202; FIG. 4). The resulting signals for S1 and S2 are then combined in combiner 10 and the combined signal is passed through IF receiving circuit 11 and then through rake receiving circuit 12D. (Sudo '202; FIG. 4). In the rake receiving circuit 12D, the combined signal is input to the finger circuits 1207-1209. (Sudo '202; FIG. 3).

The device in Sudo '202 can control the power supply to the LNA 8 connected to the antenna 6. (Sudo '202; FIG. 4; column 8, lines 17-18). Thus, the device in Sudo '202 can stop the amplification of the signal S2. However, the device in Sudo '202 cannot control the power supply to the LNA 4 connected to the antenna 1. (Sudo '202; FIG. 4). Thus, the signal S1 is always amplified by the LNA 4. Therefore, even if the LNA 8 is turned off and the signal S2 is not amplified, the LNA 4 will still amplify the signal S1, and the combiner 10 will at least have as output the amplified signal S1 after being passed through the SAW filter 5. The combined signal from the combiner 10 will then pass through the IF receiving circuit 11 and be input to the finger circuits 1207-1209 of the rake receiving circuit 12D. (Sudo '202; FIG. 3; FIG. 4). Thus, even if the power to the LNA 8 is turned off, operations of the finger circuits 1207-1209 are not suspended, because there is still a signal input to the finger circuits that comes from the antenna 1 and is amplified by LNA 4. (Sudo '202; FIG. 3; FIG. 4).

Therefore, the device of Sudo '202 does not allow for an operation of at least one finger circuit element to be suspended for a fixed, predetermined time period according to the result of an electric field level judgment.

With regard to the Sudo '101 reference, Sudo '101 neither discloses nor suggests the claimed limitations, “wherein the rake circuit includes a level judgment circuit for executing electric field level judgment based on the correlated received signals output from the plurality of finger circuit elements and a predetermined threshold level”, and, “wherein an operation of at least one finger circuit element can be suspended for a fixed, predetermined time period according to the result of the electric field level judgment.” (Emphasis Added).

In Sudo '101, a slot cycle period is divided into time periods t_1 , t_2 , t_3 , and t_4 . (Sudo '101; FIG. 11). The device of Sudo '101 provides for an intermittent receiving operation, which allows for an operation of a rake demodulation unit 40 having finger circuits 402, 404, 406, to be stopped during the periods t_1 , t_2 , and t_3 , and the demodulation operation to be made only during the period t_4 . (Sudo '101; FIGs. 12, 13; column 11, lines 50-62). In the device of Sudo '101, the time periods t_1 and t_2 are counted by low power timer means 51 with low accuracy, and the time periods t_3 and t_4 are counted by high accuracy timer means 44 with high accuracy. (Sudo '101; FIGs. 1 and 12). Due to the inferior accuracy of low power timer means 51, there may be errors in the counted time periods t_1 and t_2 that are denoted τ_1 and τ_2 respectively. (Sudo '101; column 7, lines 18-23). The time period t_4 must then be determined in order to compensate for the errors τ_1 and τ_2 in the time periods t_1 and t_2 . (Sudo '101; column 10, line 42 to column 11, line 15).

The device of Sudo '101 sets the time period t_4 by defining a standard value and correcting the standard value with a value “i” that is determined by the PN code phase calculation means 46 during the time period t_3 . (Sudo '101; FIG. 3, steps d00 and d11; column 8, lines 1-67; column 10, lines 42-56; column 11, lines 11-15). The standard value is set according to the slot cycle period and the length of the periods t_1 , t_2 , and t_3 and, thus, the standard value does not depend on a result of an electric field level judgment based on correlated received signals output from a plurality of finger circuit elements and a predetermined threshold level.

Also, the value “i” is determined by the PN code phase calculation means 46 during the time period t_3 , and the operation of the rake demodulation unit 40 having finger circuits 402, 404, 406, is stopped during the time period t_3 , so the value “i” does not depend on a result of an electric field level judgment based on correlated received signals output from a plurality of finger circuit elements and a predetermined threshold level. (Sudo ‘101; abstract). Indeed, the PN code phase calculation means 46 receives an input from the waveform storage means 45, and the waveform storage means 45 receives an input directly from the receiving unit 3, and not from the rake demodulation circuit 40 having finger circuits 402, 404, 406. (Sudo ‘101; FIG. 1). Furthermore, the PN code phase calculation means 46 of the device of Sudo ‘101 cannot be considered a rake circuit as claimed, because the PN code phase calculation means 46 does not combine correlated received signals output from a plurality of finger circuit elements.

Therefore, the values t_1 , t_2 , and t_3 , and the standard value and the value “i” that make up the value t_4 in the device of Sudo ‘101 are not dependent on a result of an electric field level judgment by a level judgment circuit in a rake circuit, where the electric field level judgment is based on correlated received signals output from a plurality of finger circuit elements and a predetermined threshold level. The operation of the device in Sudo ‘101 is controlled based on the low power timer means 51 using t_1 and t_2 , and the high accuracy timer means 44 using t_3 and t_4 , and, as a consequence, in the device of Sudo ‘101, an operation of at least one finger circuit element cannot be suspended for a fixed, predetermined time period according to the result of an electric field level judgment by a level judgment circuit that is part of a rake circuit, where the electric field level judgment is based on correlated received signals output from a plurality of finger circuit elements and a predetermined threshold level.

Therefore, independent claim 1, as amended, is neither disclosed nor suggested by the cited prior art and, hence, is believed to be allowable.

Independent claim 11 recites a receiving terminal for a CDMA system for receiving received signals from a plurality of signal propagation channels, comprising:

“a circuit for judging an electric field level of each of the received signals;

wherein operation of a control clock supply to a circuit system, which is making a correlation between a received signal that is judged to have a low electric field level and a known signal, is suspended for a fixed, predetermined period of time for power consumption reduction.” (Emphasis Added)

A receiving terminal including the above-quoted features has the advantage that received signals can be received from a plurality of signal propagation channels, a circuit judges an electric field level of each of the received signals, and operation of a control clock supply to a circuit system that is making a correlation between a received signal that is judged to have a low electric field level and a known signal is suspended for a fixed, predetermined period of time.

Sudo ‘101 neither discloses nor suggests a receiving terminal including the above-quoted features with a circuit for judging an electric field level of each of the received signals that are received from a plurality of signal propagation channels, and where operation of a control clock supply to a circuit system that is making a correlation between a received signal that is judged to have a low electric field level and a known signal, is suspended for a fixed, predetermined period of time.

In the device of Sudo ‘101, finger circuits 402, 404, and 406 do perform tracking independently of paths and demodulation. (Sudo ‘101; FIG. 13; column 12, lines 10-12). However, the outputs of the finger circuits 402, 404, and 406 are input directly to a combining unit 409 that combines skews of the demodulated outputs of each of the finger circuits 402, 404, 406, and performs path combining diversity to be supplied to the demultiplexing unit 41. (Sudo ‘101; FIG. 13; column 12, lines 13-16). Thus, in the device of Sudo ‘101, there is no circuit for judging an electric field level of each of the received signals that are received from a plurality of signal propagation channels, where operation of a control clock supply to a circuit system that is making a correlation between a received signal that is judged to have a low electric field level and a known signal, is suspended for a fixed, predetermined period of time.

Furthermore, in the device of Sudo ‘101, during a time period t_3 , when the rake demodulation circuit 40 is stopped, the waveform storage means 45 receives waveform data of a received signal from the receiving unit 3. (Sudo ‘101; FIG. 1; column 7, line 66 to

column 8, line 6.) Then, also during the time period t_3 , the PN code phase calculation means 46 performs a despreading operation on the waveform data from the waveform storage means 45 to determine an envelope level, and repeats the despreading operation while changing a phase of a despreading code that is used for the despreading operation. (Sudo '101; FIG. 3, steps d00 to d05; column 8, lines 14-24).

However, the PN code phase calculation means 46 is not able to determine a circuit system that is making a correlation between a received signal that is judged to have a low electric field level and a known signal, because the PN code phase calculation means 46 only receives waveform data from the waveform storage means 45 and has no information about the operation of the finger circuits 402, 404, 406. (Sudo '101; FIG. 1). Also, the PN code phase calculation means 46 selects a maximum value from among calculated envelope values that were calculated with the despreading code at different phases, and never selects an envelope value with a low value. (Sudo '101; FIG. 3, step d06). Thus, the PN code phase calculation means 46 in the device of Sudo '101 does not cause operation of a control clock supply to a circuit system, which is making a correlation between a received signal that is judged to have a low electric field level and a known signal, to be suspended for a fixed, predetermined period of time.

Therefore, independent claim 11 is neither disclosed nor suggested by the cited prior art and, hence, is believed to be allowable.

Independent claim 12, as amended, recites a receiver for a CDMA system with features similar to features of a receiving terminal for a CDMA system of claim 1 and, thus, is believed to be allowable for at least the same reasons claim 1 is believed to be allowable.

Independent claim 22, as amended, recites a receiver for a CDMA system with features similar to features of a receiving terminal for a CDMA system of claim 11 and, thus, is believed to be allowable for at least the same reasons claim 11 is believed to be allowable.

Independent claim 23, as amended, recites a receiving method for a CDMA system with features similar to features of a receiving terminal for a CDMA system of claim 11 and,

thus, is believed to be allowable for at least the same reasons claim 11 is believed to be allowable.

Independent claim 24 recites a receiving method for a CDMA system with features similar to features of a receiving terminal for a CDMA system of claim 11 and, thus, is believed to be allowable for at least the same reasons claim 11 is believed to be allowable.

The dependent claims are deemed allowable for at least the same reasons indicated above with regard to the independent claims from which they depend.

Conclusion:

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741.

If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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By Justin M. Sobaje

FOLEY & LARDNER LLP
Customer Number: 22428
Telephone: (310) 975-7965
Facsimile: (310) 557-8475

Justin M. Sobaje
Attorney for Applicant
Registration No. 56,252